ABSTRACT

The present invention provides methods and apparatus for the formation of a thin noble metal film which can achieve a high rate of film growth, can use inexpensive raw materials, and do not allow any impurities to remain in the thin film. Specifically, the present invention relates to a method for the formation of a thin metal film which comprises the steps of feeding a chlorine-containing raw material gas 55 into an inlet vessel 11 having a perforated plate 12 made of Cu; converting the raw material gas 55 into a plasma; etching the perforated plate 12 with the raw material gas plasma to produce a precursor 13 composed of the Cu component contained in the perforated plate 12 and the chlorine contained in the raw material gas 55; converting hydrogen gas into a plasma; after discharging the precursor 13 from the inlet vessel 11, passing the precursor 13 through a rotating magnetic field so as to cause the precursor 13 to travel toward a substrate 15 in an accelerated manner; and passing the precursor 13 through the reducing gas plasma to remove chlorine from the precursor 13 and directing the resulting Cu ions onto the substrate 15 to form a thin Cu film 62 on the substrate 15, as well as an apparatus for carrying out this method.